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IRON-ABSORPTION BAND ANALYSIS FOR THE  
DISCRIMINATION OF IRON-RICH ZONES

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## Type I Progress Report - ERTS-A

- a. Title: Iron-absorption band analysis for the discrimination of iron-rich zones

ERTS-A Proposal no.: 9648

- b. GSFC ID No. of P.I.: 1345

- c. Problems relating to progress:

Computer malfunctions delayed the processing of the remaining half of ERTS frame no. 1072-18001. Some data have recently been received, however.

Faithful photographic reproduction of the true color hues remains problematic in several image composites and in aerial photographs used for spectral analysis.

- d. Discussion and plans:

Plans include completion of the structural analysis based on an ERTS-image mosaic of Nevada. The analysis aims to evaluate the geologic nature of large-scale and small-scale lineaments and to determine the potential usefulness of statistical tests in such evaluations. An overlay will be prepared showing 1) lineaments which correlate with mapped faults, 2) lineaments which do not correlate with mapped faults, and 3) lineaments which are extensions of mapped faults.

Continued spectral analyses of recently received computer-processed images is planned. NASA aircraft overflights of parts of the Goldfield study area will be included in the spectral analysis. The aerial data are multiband black-and-white, color, and color-infrared photographs.

e. Results and applications:

Lineament analysis using an ERTS-image mosaic of Nevada is near completion. A transparent mylar overlay of a preliminary geologic map of Nevada at 1:500,000 scale has been reduced to the scale of the image mosaic (1:1,000,000) in order to determine the geologic nature of lineaments seen on the mosaic.

Initial compilation of all lineaments resulted in a very high density of features for which a complete comparison with all known faults was impractical. Therefore, detailed comparison of the lineaments and faults was limited to six areas which represent different geologic and topographic settings. The lineaments shown on an overlay (not illustrated here) for these selected areas are characterized as continuous, surficial or topographic features of any length which are straight or curvilinear and sharply distinct from surrounding, non-aligned features.

To facilitate evaluation of the geologic significance and reliability of larger-scale lineaments, a second overlay was prepared to include only those lineaments greater than 10 km in length. Added to this overlay were conspicuous large-scale lineaments which were more diffuse in appearance than the previously compiled lineaments and which included extrapolations over short distances of non-aligned features. A new category, linear zones, is also shown on this overlay. These features are typically diffuse, poorly defined lineaments, largely inferred from features within a zone of common orientation. Extrapolation for distances up to 10 km was permitted in delineation of the linear zones.

Using the overlay of the geologic map, each large-scale lineament and linear zone was evaluated for correlation with mapped faults; the derivative overlay shows excellent correlation.

Because a large number of smaller-scale lineaments are shown on the Nevada mosaic, six sample areas of varied geologic setting were chosen for evaluation. The five completed analyses show that correlation between these lineaments and mapped faults or extensions of mapped faults is relatively poor - approximately 22%, 22%, 24%, 24%, and 30%. The highest percentage correlation was found in an area north of the Las Vegas shear zone where faults are typically represented by prominent topographic features. Dominant directional trends of the lineaments appear to be fairly consistently N, NE, and NNE except in the Walker Lane, where NNW trending lineaments parallel strike-slip faults of a similar trace.

A comprehensive paper on the spectral reflectivity aspects of this experiment, as applied to the Goldfield, Nevada area, has been prepared over the previous 7 months and is now ready for publication.

Preliminary spectral analysis of color ratio composites of the western half of the Goldfield, Nevada, ERTS frame (no. 1072-18001) indicates that correlation between color anomalies and mining districts is not nearly as good as in the eastern half of the frame. Changes involving rock type and the character of the ore deposits appear to account for the poor correlation.